MECHANICAL ENERGY DOMAIN

- **A surface acoustic wave (SAW) is an acoustic wave traveling along the surface of a material exhibiting elasticity, with an amplitude that typically decays exponentially with depth into the material.**

- **Materials with relatively high magnitude of Young's modulus (e.g., buildings) can be destroyed once exposed to strong SAWs (as in earthquakes), whereas, those with relatively low Young's modulus (e.g., bubbles and biological cells[1]) can start to oscillate when driven by weak SAWs.**

- **A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider.[1]**
- **If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.**
- **The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name.**
- **Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment.**
- **Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.**

- **A strain gauge (also spelled strain gage) is a device used to measure strain on an object.**

- **Invented by Edward E. Simmons and Arthur C. Ruge in 1938, the most common type of strain gauge consists of an insulating flexible backing which supports a metallic foil pattern.**

- **The gauge is attached to the object by a suitable adhesive, such as cyanoacrylate.**

- **As the object is deformed, the foil is deformed, causing its electrical resistance to change. This resistance change, usually measured using a Wheatstone bridge, is related to the strain by the quantity known as the gauge factor.**

A piezoelectric sensor is a device that uses the piezoelectric effect to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. The prefix *piezo-* is Greek for 'press' or 'squeeze

Piezoelectric sensors are versatile tools for the measurement of various processes. They are used for quality assurance, process control, and for research and development in many industries.

Pierre Curie discovered the piezoelectric effect in 1880, but only in the 1950s did manufacturers begin to use the piezoelectric effect in industrial sensing applications.

Since then, this measuring principle has been increasingly used, and has become a mature technology with excellent inherent reliability.

In electrical engineering, capacitive sensing (sometimes capacitance sensing) is a technology, based on capacitive coupling, that can detect and measure anything that is conductive or has a dielectric different from air.

Many types of sensors use capacitive sensing, including sensors to detect and measure proximity, pressure, position and displacement, force, humidity, fluid level, and acceleration.

Human interface devices based on capacitive sensing, such as trackpads,can replace the computer mouse. Digital audio players, mobile phones, and tablet computers use capacitive sensing touchscreens as input devices.

Capacitive sensors can also replace mechanical buttons.

Microelectromechanical systems (MEMS), also written as micro-electro-mechanical systems (or microelectronic and microelectromechanical systems) and the related micromechatronics and microsystems constitute the technology of microscopic devices, particularly those with moving parts.

They merge at the nanoscale into nanoelectromechanical systems (NEMS) and nanotechnology. MEMS are also referred to as micromachines in Japan and microsystem technology (MST) in Europe.

MEMS are made up of components between 1 and 100 micrometers in size (i.e., 0.001 to 0.1 mm), and MEMS devices generally range in size from 20 micrometres to a millimetre (i.e., 0.02 to 1.0 mm), although components arranged in arrays (e.g., digital micromirror devices) can be more than 1000 mm^2.

SENSOR MECHANISM

Sensor - Sensor is a device which converts non-electrical, physical or chemical quantity into an electrical signal.

Sensors measure something which is called as Measurand.

Sensors are also called as Transducers. .In other words, **sensors** convert a measurand into an electrical signal.

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- **An accelerometer is a device that measures proper acceleration.[**

- **Proper acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest frame, is not the same as coordinate acceleration, being the acceleration in a fixed coordinate system.**

- **For example, an accelerometer at rest on the surface of the Earth will measure an acceleration due to Earth's gravity, straight upwards[3] (by definition) of $g \approx 9.81\ m/s^2$.**

- **By contrast, accelerometers in free fall (falling toward the center of the Earth at a rate of about $9.81\ m/s^2$) will measure zero.**

- **A gyroscope (from Ancient Greek γῦρος *gûros*, "circle" and σκοπέω *skopéō*, "to look") is a device used for measuring or maintaining orientation and angular velocity**

- **It is a spinning wheel or disc in which the axis of rotation (spin axis) is free to assume any orientation by itself.**

- **When rotating, the orientation of this axis is unaffected by tilting or rotation of the mounting, according to the conservation of angular momentum.**

- **Gyroscopes based on other operating principles also exist, such as the microchip-packaged MEMS gyroscopes found in electronic devices, solid-state ring lasers, fibre optic gyroscopes, and the extremely sensitive quantum gyroscope.**

- **A pressure sensor is a device for pressure measurement of gases or liquids.**

- **Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area.**

- **A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical.**

- **Pressure sensors are used for control and monitoring in thousands of everyday applications.**

- **Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude.**

- **Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators, piezometers and manometers, among other names.**

A MICROPHONE, COLLOQUIALLY NAMED MIC OR MIKE (/MAɪK/), IS A DEVICE – A TRANSDUCER – THAT CONVERTS SOUND INTO AN ELECTRICAL SIGNAL.

MICROPHONES ARE USED IN MANY APPLICATIONS SUCH AS TELEPHONES, HEARING AIDS, PUBLIC ADDRESS SYSTEMS FOR CONCERT HALLS AND PUBLIC EVENTS, MOTION PICTURE PRODUCTION, LIVE AND RECORDED AUDIO ENGINEERING, SOUND RECORDING, TWO-WAY RADIOS, MEGAPHONES, RADIO AND TELEVISION BROADCASTING, AND IN COMPUTERS FOR RECORDING VOICE, SPEECH RECOGNITION, VOIP, AND FOR NON-ACOUSTIC PURPOSES SUCH AS ULTRASONIC SENSORS OR KNOCK SENSORS.

- **A tactile sensor is a device that measures information arising from physical interaction with its environment.**

- **Tactile sensors are generally modeled after the biological sense of cutaneous touch which is capable of detecting stimuli resulting from mechanical stimulation, temperature, and pain (although pain sensing is not common in artificial tactile sensors).**

- **Tactile sensors are used in robotics, computer hardware and security systems.**

- **A common application of tactile sensors is in touchscreen devices on mobile phones and computing.**

- **Tactile sensors may be of different types including piezoresistive, piezoelectric, capacitive and**